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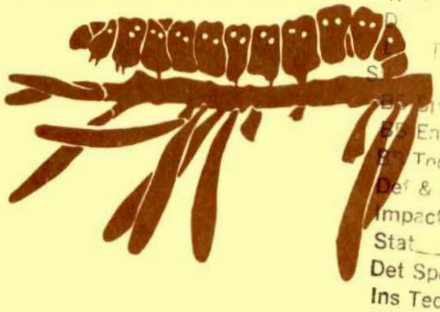
IDAHO FOREST INSECT and DISEASE REPORT



DEPT. OF LANDS

MANAGEMENT RECOMMENDATIONS BASED ON DWARF MISTLETOE SURVEYS IN SOUTHWEST IDAHO

by

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TABLE OF CONTENTS

	Page
ABSTRACT	1
INTRODUCTION	1
SURVEY AREA DESCRIPTIONS	
Area A: Pine Creek/Dry Creek	2
Area B: Deer Creek/Fleming Creek	4
SURVEY METHODS	7
RESULTS & DISCUSSION	8
I. Stand Composition >50% Non-Host	11
II. Stand Composition >50% Douglas-fir	12
SUMMARY	14
LITERATURE CITED	14
MAPS OF SURVEY AREAS	
Area A: Pine Creek/Dry Creek	15
Area B: Deer Creek/Fleming Creek	16

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ABSTRACT

Surveys designed to obtain baseline Douglas-fir dwarf mistletoe infection level information also provided information which can be of help in making current management decisions. A total of 140 variable plots were established on 30 transects through dwarf mistletoe infection centers on two different areas of state endowment lands. Data collected on infection severity, stocking levels, and the amount and condition of Douglas-fir regeneration can be used to select the best management alternative for controlling Douglas-fir dwarf mistletoe within specific areas of each stand.

INTRODUCTION

Dwarf mistletoe in Douglas-fir is a major management concern in many parts of state endowment lands in southwestern Idaho. Numerous control projects have been undertaken to reduce the impact on the timber resources of the area. While the success of these projects has generally been termed good, it has never been quantified. Local forest managers were interested in trying to quantify this success and also get an idea of reinvasion and intensification rates which could be applied in making future management decisions.

While there are six sound alternatives for dwarf mistletoe control (Schwandt, 1978), the selection of the best alternative is often a difficult decision especially in mixed stands with varying amounts of dwarf mistletoe. In some stands the use of different alternatives for specific areas within a stand may be the best approach to overall control. For example, many stands have "pockets" of dwarf mistletoe which can be treated differently from the remainder of the stand. The treatment of these pockets depends on factors such as stand composition, average tree size, and amount and condition of regeneration as well as the dwarf mistletoe infection severity level.

A simple survey method was designed to obtain the necessary "baseline" information from previously treated stands, stands undergoing logging and dwarf mistletoe treatment and some stands slated for future logging and treatment. By monitoring these stands over the years we hope to get an idea of how rates of infection spread and intensification are affected by our logging and mistletoe reduction treatments.

In addition, the survey information obtained in stands slated for management activities can be put to use now to help select the best management alternative for each pocket of dwarf mistletoe surveyed.

Two areas were suggested by local forest managers as good potential sites for obtaining information from several stands with a variety of management activities either in the past or planned for the future.

SURVEY AREA DESCRIPTIONS

A. Pine Creek/Dry Creek Area (T5N, R5E, Section 1, 12, 13)

This area is about 5 miles southeast of Idaho City in southwestern Idaho about 25 miles northeast of Boise. Pine Creek and Dry Creek are small streams which drain east and north into Mores Creek just east of Idaho City.

The topography of the area is rolling hills of decomposed granite with slopes of 50% to 60% and eastern to northern aspects (Figure 1). Much of the area was logged about 30 years ago and some has recently been logged and treated for dwarf mistletoe through a cull removal project while much of the remainder is under consideration for timber sales in the near future. The untreated portions of the present stand consist of lightly stocked second growth sawtimber intermingled with denser patches of sapling and polesized timber. Species composition of the sawtimber is about 75% Douglas-fir and 25% ponderosa pine while the smaller trees are primarily Douglas-fir (Figures 2 and 3).

Figure 1. Pine Creek area with rolling topography and northeast aspects. (Transects A-8 and A-9.)

Figure 2. Dense stand of polesize Douglas-fir in the Pine Creek/Dry Creek area. (Transects A-7 and A-8.)

Figure 3. Proposed sale area containing severely infected Douglas-fir. (Transects A-4 and A-6.)

The dwarf mistletoe treatment in a portion of the area (155 acres) increased the ponderosa pine component to 33% while removing badly infected Douglas-fir and reducing the number of trees per acre from 337 to 120. The residual trees were about 60 years old with an average DBH of 10 inches.

The dwarf mistletoe was observed in pockets throughout the area, often separated by the small finger ridges running through the area.

B. Deer Creek/Fleming Creek Area (T8N, R3E, Sec. 9, 10, 11, 12)

This is a broad area of rolling hills at the upper reaches of the Deer Creek and Fleming Creek drainages about 15-20 miles northeast of Horseshoe Bend. Deer Creek drains mostly north into the South Fork of the Payette River about 5 miles upstream from Banks while Fleming Creek drains westward into the Payette River 2 miles downstream from Banks.

Much of the area has been logged at least two times and heavy grazing and gophers have kept regeneration well below desirable levels in many places (Figure 4). Many dwarf mistletoe infected trees had to be left to maintain even minimal stocking levels, while others were left as culls by loggers and follow-up cull removal projects have not been justified (Figure 5). Most residual stands have considerable understocked areas intermixed with clumps of Douglas-fir and ponderosa pine (Figure 6). However, there are a few areas with relatively good stocking of regeneration (Figure 7) and a few scattered clumps of older growth ponderosa pine (Figure 8).

Figure 4. Poorly stocked area of Deer Creek.

Figure 5. Infected residual Douglas-fir in the Fleming Creek area (Transect B-5)

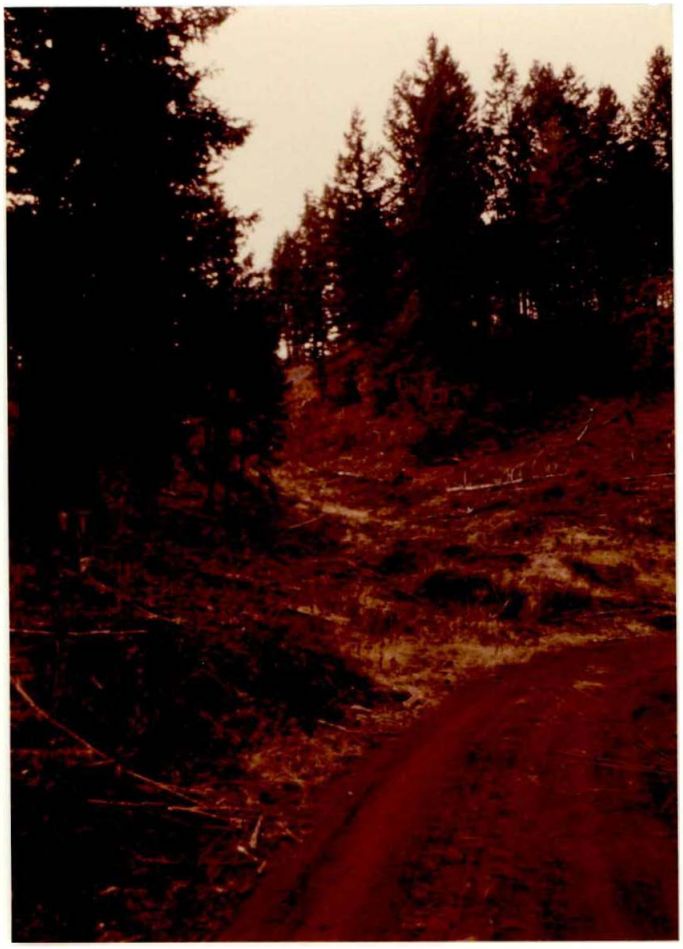


Figure 6.

Islands of well-stocked Douglas-fir in the Deer Creek area. (Transect B-1.)

Figure 7. Well stocked area of second growth ponderosa pine in the Fleming Creek area. (Transect B-3.)

Figure 8. Scattered old growth ponderosa pine on a ridge between Fleming Creek and Deer Creek.

SURVEY METHODS

In order to obtain dwarf mistletoe spread and intensification information which could be compared over time, initial measurements on infection levels would be needed. Much of the stand area had no mistletoe so data from these areas would not be useful unless dwarf mistletoe spread into the area. Since the area is being managed to prevent such spread, it is doubtful that measurements for uninfected areas would be worthwhile unless they were nearby infected areas. Therefore, the survey was contentrated on the pockets of mistletoe already present in a stand. By taking data within these pockets we could get a good idea of the dwarf mistletoe intensity, stand composition and regeneration condition within each pocket of infection.

Intensity changes in infected trees would be determined by comparing ratings on specific trees over several years thus requiring some sort of permanent tree identification system. Changes in overall stand intensity levels could be determined with more general observations while spread within and beyond infection centers could be determined by comparing the number of infected and uninfected trees in an area over time.

After several field trials we decided the best method to obtain necessary baseline data would be to place permanent plots 2 chains apart on transects through the pockets of infection. After plainly marking the transect and plot number on nearby trees, stumps or rocks, a plot-center was selected and painted. A prism cruise was then conducted from plot center tallying trees in a clockwise direction from true north. The species, DBH, and dwarf mistletoe rating for each tree in the prism cruise was recorded (Figure 9).

Figure 9. Data collection on a plot. (Transect B-5.)

Mistletoe ratings were based on the 6-point system developed by Hawksworth (1956 and 1977). In addition, the number of infected and noninfected Douglas-fir regeneration (trees < 4" dbh) within a 1/500 acre plot at plot center were recorded (Figure 10).

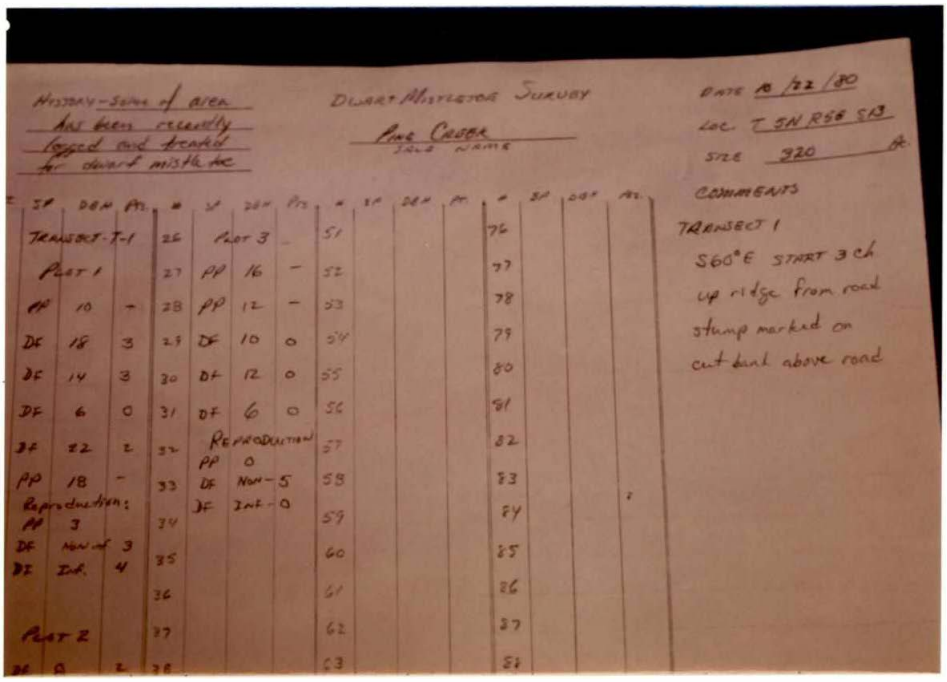


Figure 10. Sample data sheet with recorded field data.

The average dwarf mistletoe rating was calculated for each plot and for each transect and will be compared to values obtained in the future from the same plots and transects. Stand composition percentages were also calculated to be used with the regeneration observations and infection severity information to help select the best management alternative for each pocket of infection.

RESULTS AND DISCUSSION

Since all transects were oriented to pass through known pockets of dwarf mistletoe, it was not surprising that some transects recorded high levels of infection. However, the dwarf mistletoe infection levels, proportion of infected mature and regeneration Douglas-fir, and stocking levels of all species varied greatly from one pocket of infection to another (Tables I and II). Maps showing approximate transect locations can be found in the appendix. This information can be used by timber managers to follow a logical decision-making process to select the best control alternative for each pocket of infection. This process is briefly diagrammed in Figure 11 and is followed through the discussion below.

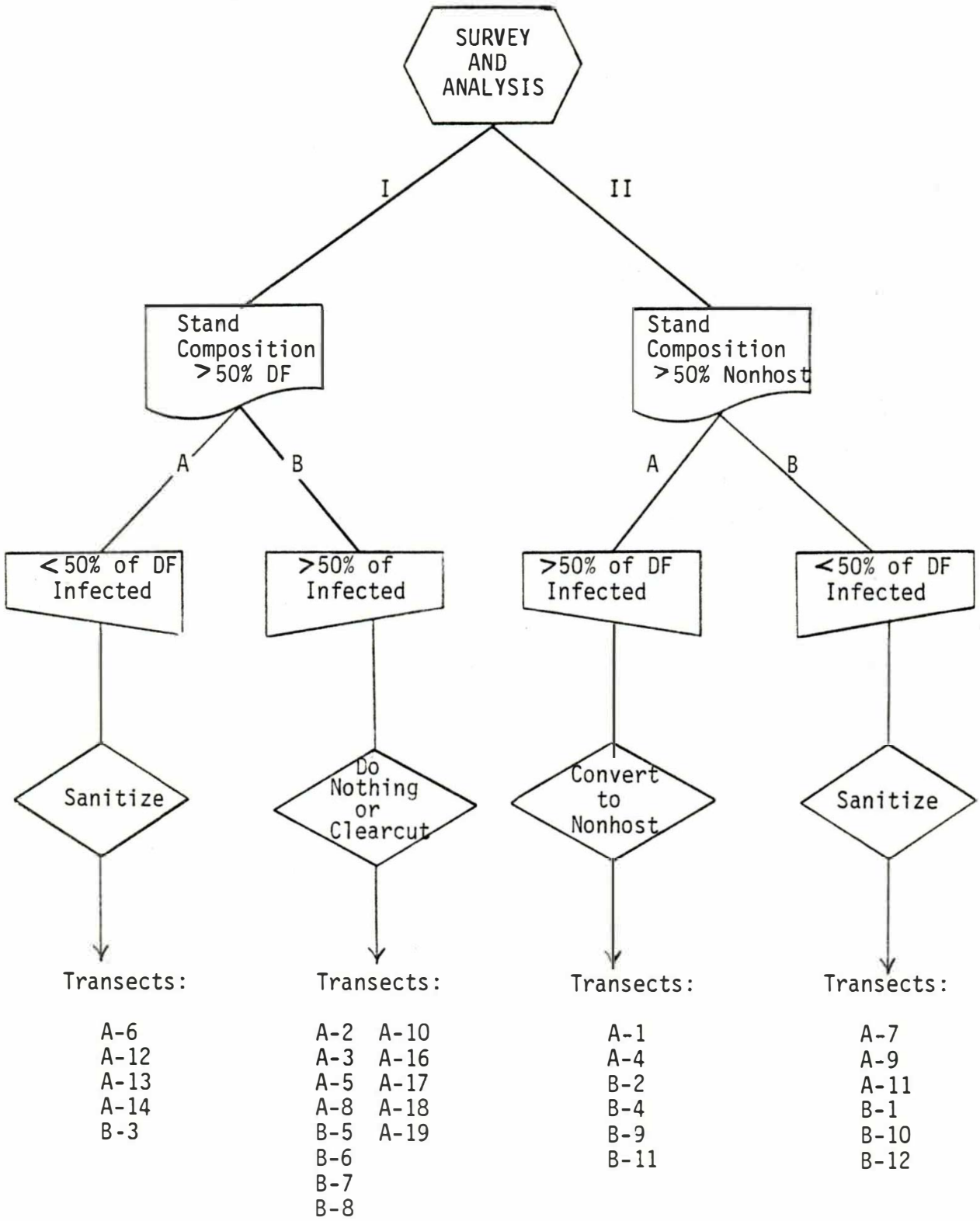
Table I. Stand composition, percentage of Douglas-fir infected and their average infection rating, and condition of any Douglas-fir regeneration for each transect on Area A (Pine Creek/Dry Creek area).

Transect	# Plots	# DF	# Non-host	# Non-host	% DF infected	Ave. rating	Regen. infected
A-1	5	11	12	52	82	3.02	No
A-2	4	20	8	29	50	1.80	Yes
A-3	4	25	8	24	80	2.20	Yes
A-4	9	11	54	83	82	3.33	Yes
A-5	4	40	5	11	77	2.70	Yes
A-6	5	20	7	26	15	1.70	No
A-7	5	19	32	63	47	3.20	Yes
A-8	5	28	16	41	61	2.57	Yes
A-9	4	17	24	59	35	3.17	Yes
A-10	6	27	11	29	67	3.10	No
A-11	4	20	27	57	5	2.00	None
A-12	4	28	20	42	29	1.37	No
A-13	7	62	27	30	16	1.60	No
A-14	6	34	18	43	12	2.25	No
A-15	7	36	8	18	30	2.40	Yes
A-16	3	10	3	23	50	1.80	Yes
A-17	3	21	10	32	95	3.26	Yes
A-18	3	24	16	41	88	3.19	No
A-19	7	49	16	25	86	2.74	Yes

Table II. Stand composition, percentage of Douglas-fir infected and their average infection rating, and condition of any Douglas-fir regeneration for each transect on Area B (Deer Creek/Fleming Creek area).

Transect	# Plots	# DF	# Non-host	# Non-host	% DF infected	Ave. rating	Regen. infected
B-1	13	29	42	59	21	2.00	-
B-2	3	12	18	60	75	2.77	Yes
B-3	3	14	7	33	43	2.33	No
B-4	3	13	16	55	69	3.00	No
B-5	2	19	5	21	79	2.47	No
B-6	2	19	1	5	58	1.73	Yes
B-7	3	15	4	21	100	3.86	Yes
B-8	3	21	3	12	71	3.20	No
B-9	3	8	14	64	62	2.60	-
B-10	4	6	13	68	33	1.00	-
B-11	4	5	34	87	60	1.33	-
B-12	3	6	37	86	33	1.50	-

Figure 11. Flow chart for decision-making process for dwarf mistletoe management.



I. STAND COMPOSITION >50% NON-HOST

The surest way to control dwarf mistletoe is to utilize or convert to non-host species. Therefore, the first criterion the manager should look for in making his management decision regarding a pocket of dwarf mistletoe is the stocking levels of desirable nonhost trees.

If there is satisfactory stocking of desirable nonhost trees, then the mistletoe infection severity on Douglas-fir should be examined to determine if it can be successfully sanitized.

A. < 50% DOUGLAS-FIR INFECTED

If the proportion of infected Douglas-fir is low, the stand could be sanitized and the mixed stand composition can be retained. This type of situation is exemplified by transects A-7, A-9, A-11, B-1, B-10 and B-12. Since only a few Douglas-fir are infected, their loss would have little effect on the residual stand composition yet would permit the remaining Douglas-fir to reach maturity without serious threat from dwarf mistletoe.

If possible, the sanitation should be combined with the next stand entry for thinning or commercial harvesting purposes. However, the longer the sanitation is delayed, the more opportunity there will be for spread of the dwarf mistletoe.

B. > 50% DOUGLAS-FIR INFECTED

If a high proportion of the Douglas-fir are infected (including regeneration), then the manager should be concentrating on stand conversion to nonhost species until all the infected Douglas-fir can be removed or killed. This can be done during thinnings before the nonhost trees are harvested or when they are harvested.

This decision depends primarily on stocking levels and stand age. Once all infected Douglas-fir have been eliminated, the manager can return to mixed species management. Transects A-1, A-4 and B-2, B-4, B-9 and B-11 are good examples of areas where more than 50% of the stand composition is nonhost trees but more than 50% of the Douglas-fir component is infected. The size and stocking levels of nonhost trees in transect A-4 indicates that removal of infected Douglas-fir during a thinning/cull removal project might be desirable while elimination of infected Douglas-fir from the other transects with older trees and lower stocking levels might best be delayed until commercial harvest of the nonhost species.

II. STAND COMPOSITION > 50% DOUGLAS-FIR

If the stand composition is primarily Douglas-fir, management alternatives are reduced considerably because he can no longer rely on nonhost species. Managers can choose to (1) try and deal with the dwarf mistletoe problem through thinnings, (2) address it during a commercial harvest, or (3) postpone any action until sometime in the future (do nothing). His selection is again based primarily on stocking levels (including regeneration success) and levels of infection.

A. < 50% DOUGLAS-FIR INFECTED

If only a small proportion of the Douglas-fir are infected (e.g., transects A-6, A-12, A-13, A-14, A-15, B-3) and stocking levels are high (A-12, A-13, A-14), a thinning/sanitation cut may be prescribed. However, if stocking levels are low already (A-6, A-15, B-3), removal of infected trees might be best postponed until a commercial harvest is made. This would be especially true where trees are nearing merchantability and the manager is not presently concerned about regeneration becoming infected.

B. > 50% DOUGLAS-FIR INFECTED

In pockets where Douglas-fir is the principal species and more than half are infected with dwarf mistletoe, sanitation through thinning would not be realistic. If the trees are nearly merchantable the "do nothing" alternative may be advised until harvest. But if the trees are still quite young the manager should be thinking in terms of stand conversion by planting of nonhost species or clearcutting and regenerating a mixed stand. Ten of the 19 transects in the Pine Creek/Dry Creek area fall into this category along with four from the Deer Creek/Fleming Creek area (Figure 11).

Since much of the Pine Creek area is slated for timber sales in the near future, plans can be made to eliminate many of these pockets of infection. Fortunately the area has a good history of regeneration survival and managers are contemplating planting some openings and clearcut areas to ponderosa pine. Burning might be the most economical treatment for a few pockets with many badly infected trees (i.e., A-5, A-17, A-18).

Unfortunately establishment of regeneration is much more difficult in Area B due to past clearcutting and over-grazing followed by brush and gopher problems. Therefore mistletoe control efforts are being postponed until adequate stocking levels are achieved. However, future problems can be minimized by concentrating restocking efforts on nonhost species. Once satisfactory levels of regeneration have been achieved, areas with scattered infected overstory trees (Figure 4) should be treated to prevent rapid spread to nearby Douglas-fir regeneration. These trees could be killed by girdling and left in place since most are unattractive commercially. However, care must be exercised to insure that double cuts are made completely through the bark to prevent trees from recovering like those in figures 12 and 13.

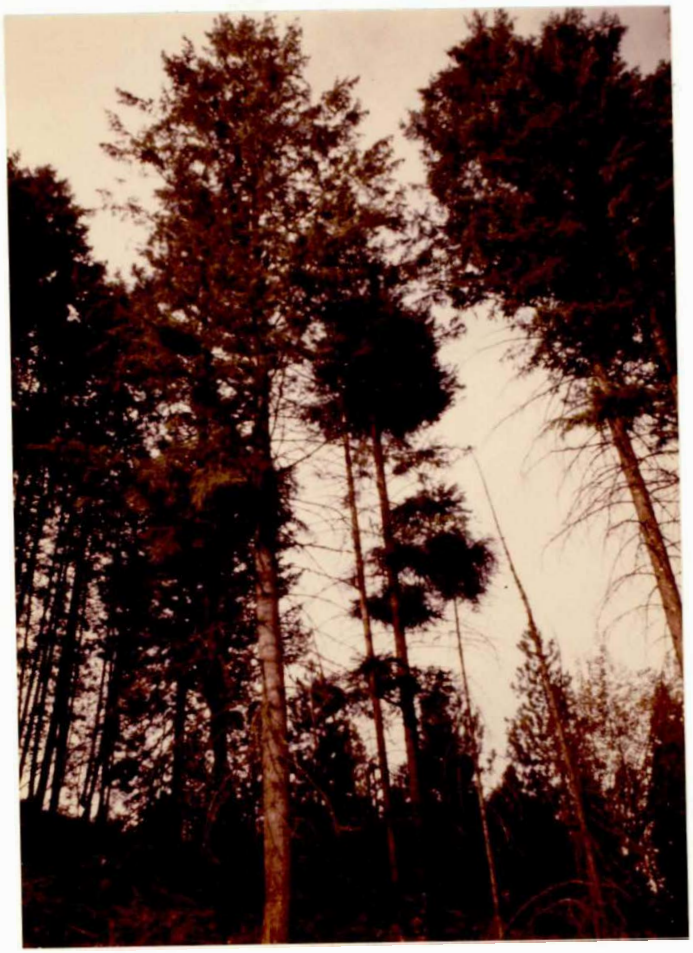


Figure 12.

Badly infected Douglas-fir trees surviving in spite of double girdle attempt.

Figure 13. Close-up of double girdling reveals segments of incomplete girdling which permits trees to survive.

SUMMARY

Much of the dwarf mistletoe in southwestern Idaho is found in pockets of infection. Basic stand information collected by surveys through such pockets can be used to help select proper management alternatives. Since the use of nonhost species is most appealing, stocking levels of nonhost species are examined first. Then infection severity is examined by rating infected trees and calculating the percentage of Douglas-fir that are infected.

The manager can then take the stocking and infection level figures along with observations on infection in regeneration and size of trees to determine which alternative is best suited for each pocket of infection.

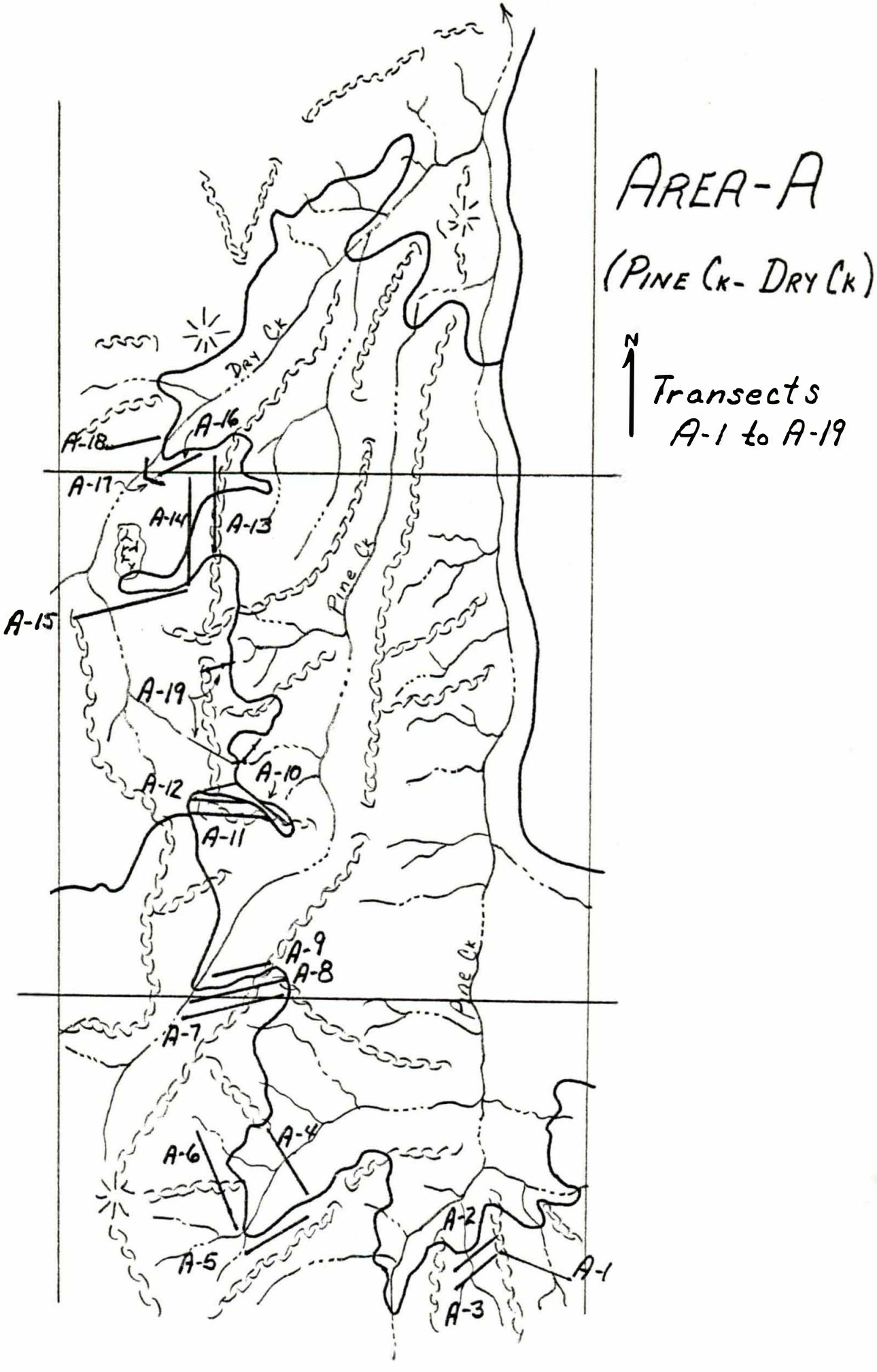
Future surveys of these areas will be compared to these results to determine how successful logging operations and dwarf mistletoe reduction projects have been in reducing infection levels. Information will also be used to get an idea of how rapidly reinvasion and intensification occur in these areas.

LITERATURE CITED

Hawksworth, F. G. 1958. Rate of spread and intensification of dwarf mistletoe in young lodgepole pine stands. Jour. Forestry 56:404-407.

Hawksworth, F. G. 1977. The 6-class dwarf mistletoe rating system. USDA For. Service. General technical report RM-48.

Schwandt, J. W. 1977. Dwarf mistletoe control guidelines for Idaho forests. Idaho Department of Lands, Report #77-2.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Transects
A-1 to A-19
DRY CK
PINE CK
A-18
A-16
A-17
A-14
A-13
A-15
A-19
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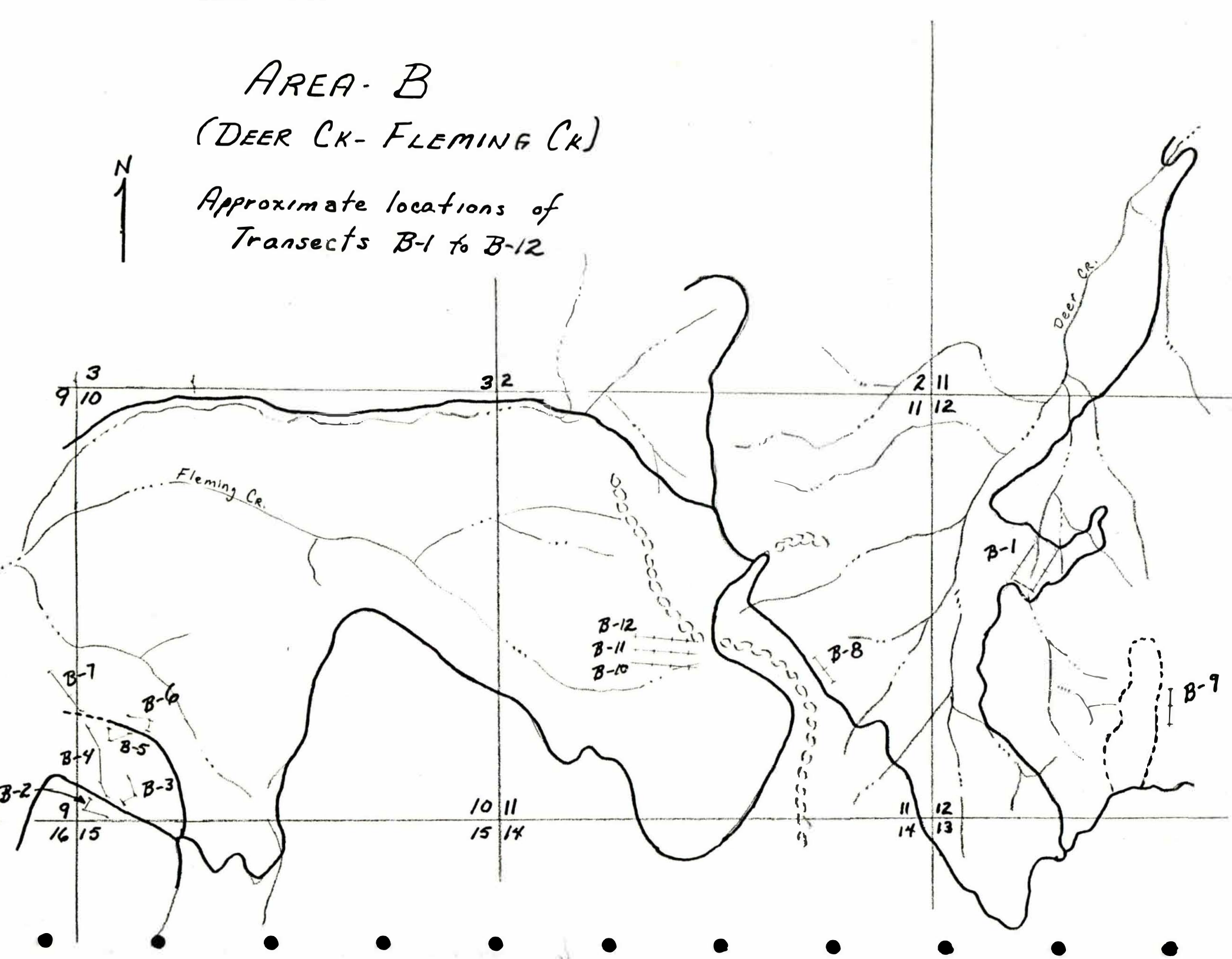
A-3


AREA - B
(DEER CK - FLEMING CK)
N
Approximate locations of
Transects B-1 to B-12
Deer Cr.
Fleming Cr.
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
3
9 10
3 2
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